

## PATENT ABSTRACTS OF JAPAN

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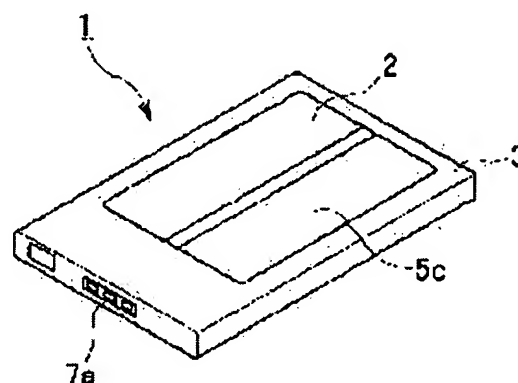
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## (54) BATTERY AND PORTABLE TERMINAL PROVIDED THEREWITH

## (57)Abstract:

PROBLEM TO BE SOLVED: To make a battery provided with a laminate pack thin, and to improve mechanical strength.

SOLUTION: A battery unit 2 is formed by a battery cell of a laminate pack, a circuit board electrically connected to each terminal of the battery cell, and a connector provided on the circuit board. A plug-in portion 7a of the connector is exposed, and the battery cell, the circuit board, and the connector are wrapped by a resinous mold portion 3 and integrated to be a battery 1.



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CLAIMS

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[Claim(s)]

[Claim 1] The dc-battery characterized by having had the battery cell of a lamination pack, the circuit board electrically connected to each terminal of this battery cell, and the electrical connection electrically connected to this circuit board, having exposed the connection edge of this electrical connection, having wrapped these battery cells, the circuit board, and an electrical connection in the resin mold section, and unifying.

[Claim 2] The dc-battery according to claim 1 characterized by said a part of battery cell being exposed from said resin mold section.

[Claim 3] Said electrical connection is a dc-battery according to claim 1 or 2 characterized by being the connector directly formed on said circuit board.

[Claim 4] Said electrical connection is a dc-battery according to claim 1 or 2 characterized by consisting of connectors formed at the tip of the lead wire connected to the circuit board, and this lead wire, and these lead wire and a connector being exposed from the resin mold section.

[Claim 5] Said electrical connection is a dc-battery according to claim 1 or 2 characterized by being the connection terminal prepared on the circuit board.

[Claim 6] The personal digital assistant characterized by having the dc-battery indicated to either of said claim 1 to claims 5.

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DETAILED DESCRIPTION

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## [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the personal digital assistant equipped with a dc-battery suitable as an object for cellular phones etc., and this dc-battery.

[0002]

[Description of the Prior Art] For example, the dc-battery used for personal digital assistants, such as a portable telephone and PHS (personal handy phone), is in the inclination formed into small lightweight with improvement in the dc-battery engine performance every year. Conventionally, as for the dc-battery used with a personal digital assistant, what has the case manufactured by carrying out deep-drawing shaping of the aluminum material (this is hereafter called aluminum can dc-battery) was in use. However, the aluminum can dc-battery originated in carrying out deep-drawing shaping of the case, the thickness dimension of a dc-battery had constraint, and the limitation was in thin shape-ization.

[0003] Then, a unit cell is sealed with a laminate film and the dc-battery of the lamination pack which attained small and light weight, and thin shape-ization is proposed (for example, JP,2000-323110,A). If the dc-battery of this lamination pack remains as it is, its rigidity is low and it must raise rigidity with a certain reinforcement means.

[0004] Rigidity was raised by putting the dc-battery of a lamination pack in the case made of resin from those front flesh-side both sides, carrying out ultrasonic welding of the case on a side front, and the case on a background, and pasting up conventionally, as this reinforcement approach.

[0005]

[Problem(s) to be Solved by the Invention] However, with this structure, since a case will be prepared in the outside of a lamination pack, there is a problem that the thickness of a dc-battery will become thick. Moreover, since it had a clearance in a case, the rigidity demanded was not able to be acquired. Furthermore, when it is made to fall, a possibility of damaging from a welding also has a case. Moreover, there is also a possibility of a foreign matter trespassing upon the interior of a case, and carrying out short-circuit etc.

[0006] then, this invention -- structure -- the personal digital assistant equipped with the dc-battery and this dc-battery of the lamination pack mold which can be equipped with predetermined rigidity though easy, and can attain small and light weight, and thin shape-ization is offered.

[0007]

[Means for Solving the Problem] The dc-battery applied to invention indicated to claim 1 in order to solve the above-mentioned technical problem is equipped with the battery cell of a lamination pack, the circuit board electrically connected to each terminal of this battery cell, and the electrical connection electrically connected to this circuit board, exposes the connection edge of this electrical connection, and is characterized by having covered these battery cells, the circuit board, and an electrical connection with the resin mold section, and unifying.

[0008] Thus, since the resin mold section functions as reinforcing materials by constituting, the rigidity of a dc-battery improves. Moreover, since a battery cell, the circuit board, and an electrical connection are wrapped in by the resin mold section and there is no clearance in the interior, a foreign matter does not trespass upon the interior of a dc-battery. Moreover, the components mark of a dc-battery can be lessened and the simplification of structure and the thinning of a dc-battery can be realized.

[0009] Invention indicated to claim 2 is characterized by said a part of battery cell being exposed from said resin mold section in invention indicated to claim 1. Thus, when a battery cell expands by the temperature rise by constituting, it can escape in the part exposed from the resin mold section.

[0010] It is characterized by invention indicated to claim 3 being the connector with which said electrical

connection was directly prepared on said circuit board in invention according to claim 1 or 2. Thus, association of the circuit board and a connector is reinforced by the resin mold section by constituting. In invention according to claim 1 or 2, said electrical connection consists of connectors formed at the tip of the lead wire connected to the circuit board, and this lead wire, and invention indicated to claim 4 is characterized by these lead wire and a connector being exposed from the resin mold section. Thus, association of the circuit board and lead wire is reinforced by the resin mold section by constituting. It is characterized by invention indicated to claim 5 being the connection terminal with which said electrical connection was prepared on the circuit board in invention according to claim 1 or 2.

[0011] The personal digital assistant concerning invention indicated to claim 6 is characterized by having the dc-battery indicated to either of said claim 1 to claims 5. Thus, by constituting, the dc-battery storage space in a personal digital assistant can be lessened.

[0012]

[Embodiment of the Invention] Hereafter, the gestalt of implementation of this invention is explained with reference to the drawing of drawing 16 from drawing 1.

[Gestalt of the 1st operation] First, the gestalt of implementation of the 1st of this invention is explained with reference to the drawing of drawing 12 from drawing 1. Drawing 1 is the perspective view which looked at the dc-battery 1 in the gestalt of the 1st operation from the side front, and drawing 2 is the perspective view seen from the background.

[0013] Are used as the object for portable telephones and the object for PHS as a personal digital assistant, for example, a dc-battery 1 is a lithium ion dc-battery. The dc-battery 1 consists of a dc-battery unit 2, the resin mold section 3, and a label 4. The dc-battery unit 2 is equipped with a battery cell 5, the circuit board 6, and a connector (electrical connection) 7 as shown in drawing 3 and drawing 4.

[0014] A battery cell 5 is equipped with an electrolyte and an electrode in the container which made the laminate film which comes to carry out the laminating of the resin film to front flesh-side both sides of aluminium foil the shape of a tube, it piles up the terminal of a container, seals and is formed. The battery cell 5 of this lamination pack is a battery cell which can perform small and thin shape-ization as compared with what uses the metal container by which deep-drawing shaping was carried out. In the battery cell 5, positive-electrode terminal 5a and negative-electrode terminal 5b have extended.

[0015] The circuit board 6 is a substrate which contains the \*\* safety circuit at the circuit for charge control connected to positive-electrode terminal 5a of a battery cell 5, and negative-electrode terminal 5b, and the time of short. The crevices 6a and 6a for positioning which make an abbreviation hemicycle are formed in the both ends of the circuit board 6. The connector 7 is formed in the center of a front face of the circuit board 6 in one, and is connected to positive-electrode terminal 5a of a battery cell 5, and negative-electrode terminal 5b through said each circuit of the circuit board 6. That is, the connector 7 is directly formed on the circuit board 6. This connector 7 is a member which is inserted in the connector 25 of the portable telephone K mentioned later, and connects a battery cell 5 and a portable telephone electrically. It points to plug section (connection edge) 7a of a connector 7 in the front end side of a battery cell 5.

[0016] Thus, as the constituted dc-battery unit 2 shows drawing 1, except for surface center-section 5c of a battery cell 5, and plug section 7a of a connector 7, the whole is wrapped in the resin mold section 3 without a clearance, it is unified, a label 4 is stuck on the resin mold section 3 by the side of a rear face, and the dc-battery 1 of a rectangle thin shape is constituted. Thereby, a battery cell 5, the circuit board 6, and a connector 7 are fixed by the resin mold section 3 in one.

[0017] Realizing thin shape-ization of a dc-battery 1, since according to the dc-battery 1 of the gestalt of this 1st operation resin mold section 3 the very thing has rigidity and functions as reinforcing materials, the reinforcement of the dc-battery 1 of a lamination pack mold and rigidity become high, impact nature etc. increases, and dependability improves. Moreover, since the resin mold section 3 functions also as reinforcing materials to a connector 7, its dependability of a connector 7 also improves.

[0018] Moreover, since a battery cell 5, the circuit board 6, and a connector 7 are wrapped in by the resin mold section 3 without the clearance, the fault which a foreign matter does not trespass upon the interior of a dc-battery 1, and originates in foreign matter invasion can be prevented beforehand.

[0019] Moreover, since resin mold section 3 the very thing functions as an insulating material, other insulating members are unnecessary, since a battery cell 5, the circuit board 6, and a connector 7 are really fixed by the resin mold section 3, the structure of a dc-battery 1 becomes easy and components mark can also be lessened.

[0020] Furthermore, since surface center-section 5c of a battery cell 5 is exposed from the resin mold section 3, when a battery cell 5 expands by the temperature rise, this surface center-section 5c can be bulged outside, and it can escape. Therefore, both a battery cell 5 and the resin mold section 3 are avoidable from breakage.

[0021] Next, the manufacture approach of a dc-battery 1 is explained with reference to drawing 5 . First, the circuit board 6 which equipped positive-electrode terminal 5a of a battery cell 5 and negative-electrode terminal 5b with the connector 7 is joined by spot welding etc., and the dc-battery unit 2 as beforehand shown in drawing 3 is formed.

[0022] And this dc-battery unit 2 is set to attachment slot 11a formed in female mold (metal mold) 10a made from aluminum. Plug section 7a of the connector 7 of the dc-battery unit 2 is made close to 11d of paries medialis orbitae of attachment slot 11a at this time by making it engage with the locator pins 11c and 11c which formed the crevices 6a and 6a for positioning of the circuit board 6 of the dc-battery unit 2 in attachment slot 11a. Thereby, the space section is formed in the perimeter of the dc-battery unit 2.

[0023] The gage pin 12 of female mold 10a is inserted in the tooling holes 13 of punch 10b, and it carries out [ mold clamp ] of punch 10b and the female mold 10a in order to make attachment slot 11 of female mold 10a a adjust attachment slot 11 of punch (metal mold) 10b made from aluminum b in this condition. At this time, extrusion hole 11e prepared in the center section of attachment slot 11b of punch 10b is close to surface center-section 5c of a battery cell 5.

[0024] Next, polyamide resin or the resin of a polyolefine system is poured in with low-temperature low voltage from the resin impregnation slot 14 (14a, 14b) formed in a part for the joint of punch 10b and female mold 10a. Resin is poured in with low-temperature low voltage for having a bad influence neither on a battery cell 5 nor the circuit board 6. Since the mechanical strength is higher than polyamide resin, the resin of a polyolefine system is suitable to form the dc-battery 1 of high intensity.

[0025] The poured-in resin spreads in the mold cavity 11 (11a, 11b) formed between attachment slot 11a in metal mold 10, and 11b. Resin is poured into the perimeter of the dc-battery unit 2 except plug section 7a of the connector 7 close to 11d of paries medialis orbitae of surface center-section 5c of the dc-battery unit 2, and female mold 10a close to knockout hole 11e of punch 10b with the gestalt of this operation.

[0026] And a mold aperture will be carried out, metal mold 10 will be extruded, if it leaves and cools compulsorily and resin solidifies within metal mold 10, a product is extruded by the hole 15, and manufacture of a dc-battery 1 is ended. Thereby, the dc-battery 1 which surface center-section 5c of a battery cell 5 and plug section 7a of a connector 7 exposed from the resin mold section 3 is manufactured.

[0027] Since according to the manufacture approach of this dc-battery set the dc-battery unit 2 in metal mold 10, and pour in resin into the mold cavity 11 of metal mold 10, it is made to solidify within metal mold 10, an after [ cooling ] mold aperture is carried out and the dc-battery 1 is manufactured, the dc-battery 1 which wrapped a battery cell 5, the circuit board 6, and a connector 7 in the resin mold section 3 without the clearance, and was unified can be manufactured easily, and productivity improves.

[0028] Next, the portable telephone K as a personal digital assistant which equips with said dc-battery 1 based on the drawing of drawing 6 and drawing 7 is explained. Since a display 20 and the key stroke section 21 are the things of the common knowledge structure constituted possible [ folding ] by the hinge 22, the whole configuration explains the portable telephone K shown below only with the perspective view seen from the background in the condition of having folded up so that it might not be shown but he could understand the wearing condition of a dc-battery 1.

[0029] The concave hold section 23 which equips the background of a control unit 21 with a dc-battery 1 is formed in the portable telephone K. A lid 24 is attached in this hold section 23 removable. Stop section 24b is formed in a tip side. Heights 24a and 24a stop stop section 24b on the discharge hook H by the side of a portable telephone K, where Heights 24a and 24a are stopped in the hold section 23, and specifically, they attach in the end face side of a lid 24 at the hold section 23.

[0030] The body side connectors 25 which are paries-medialis-orbitae 23a which counters the hold section 23 in the slide direction of a dc-battery 1, and are inserted in this connector 7 in the location which counters a connector 7 are \*\*\*\*\* with picking. That is, after setting a dc-battery 1 to the hold section 23, it has the structure where the connector 7 of a dc-battery 1 is connected to the body side connector 25 by making a dc-battery 1 slide to the connector 7 side which is the front. Therefore, when the hold section 23 equips with a dc-battery 1 and a connector 7 is inserted in the body side connector 25, the space section for plug cost of a dc-battery 1 will be formed between the back end sections of a dc-battery 1.

[0031] And as shown in drawing 7 , pair formation of the fixed rib 26 is carried out on the background by the side of the end face of a lid 24. These fixed ribs 26 and 26 are inserted in the space section formed between the hold section 23 and the back end section of a dc-battery 1 at the time of junction of the connector 7 of a dc-battery 1, i.e., the space section used as the plug cost of a connector 7. And each fixed rib 26 is equipped with inclined plane 26a, and when a lid 24 is attached in the hold section 23, it generates the force which supports the back end section of a dc-battery 1 (going ahead). thus, dc-

battery 1 the very thing is miniaturized, and the tooth space of a harness of the hold section 23 which contains a dc-battery 1 in the constituted portable telephone K is unnecessary -- since only a part can be made small -- a portable telephone K -- as a whole -- this -- small -- it can lightweight-ize.

[0032] Next, according to the drawing of drawing 6 - drawing 12, the procedure of equipping a portable telephone K with a dc-battery 1 is explained. As shown in drawing 6, the lid 24 of a portable telephone K is opened and removed, and the hold section 23 is equipped with a dc-battery 1 (drawing 8). Next, as an arrow head shows, a dc-battery 1 is made to slide ahead to drawing 8, and the connector 7 of a dc-battery 1 is inserted in the body side connector 25 at it (drawing 9). As shown in drawing 10 and drawing 11, height 24a of a lid 24 in next, the condition of having stopped in the hold section 23. If a lid 24 is rotated in the direction of closing, a fixed rib 26 will be inserted between the back end section of a dc-battery 1, and the hold section 23. If stop section 24b stops on the discharge hook H by the side of a portable telephone K (drawing 12), it will be blockaded with a lid 24 and the hold section 23 will end the attachment to the portable telephone K of a dc-battery 1. When equipping with a dc-battery 1 in the case of the gestalt of this 1st operation, since the actuation which folds up and contains a harness becomes unnecessary, wearing becomes easy. Moreover, migration in the direction from which a dc-battery 1 separates with the fixed rib 26 of a lid 24 can be regulated, and a dc-battery 1 can be attached certainly without a backlash.

[0033] [Gestalt of the 2nd operation] Next, the gestalt of implementation of the 2nd of this invention is explained with reference to the drawing of drawing 13 and drawing 14. Drawing 13 shows the appearance of the dc-battery 1 of the gestalt of this 2nd operation, and drawing 14 shows the condition of the dc-battery unit 2 before carrying out resin mold. The point that the dc-battery 1 of the gestalt of the 2nd operation is different from the thing of the gestalt of the 1st operation is as follows.

[0034] With the gestalt of the 2nd operation, although the connector 7 is directly formed on the circuit board 6 with the gestalt of the 1st operation, as shown in drawing 14, the harness (lead wire) 31 connected to the \*\* safety circuit at the circuit for charge control of the circuit board 6 and the time of short extends from the center section of this circuit board 6, and the connector 32 is formed at the tip of this harness 31.

[0035] And as shown in drawing 13, with the dc-battery 1 of the gestalt of the 2nd operation, the base of the harness 31 which separates from the circuit board 6 to the point is exposed from the resin mold section 3. With the gestalt of this 2nd operation, the harness 31 and the connector 32 constituted the electrical connection, and most and the connector 32 of a harness 31 are exposed from the resin mold section 3. Since it is the same as the thing of the gestalt of the 1st operation about other configurations, the same sign is given to the same mode part, and explanation is omitted.

[0036] In the dc-battery 1 of the gestalt of this 2nd operation, since the resin mold section 3 reinforces the connection of a harness 31 and the circuit board 6, dependability improves. Since it is the same as the thing of the gestalt of the 1st operation about other operation and effectiveness, explanation is omitted. It can manufacture by the manufacture approach which also explained the dc-battery 1 of the gestalt of this 2nd operation in the gestalt of the 1st operation by preparing the hole which makes a harness 31 insert in a part for the joint of female mold 10a and punch 10b. Moreover, the dc-battery 1 of the gestalt of this 2nd operation can equip the portable telephone which has the hold space of a harness 31, and a connector corresponding to a connector 32.

[0037] [Gestalt of the 3rd operation] Next, the gestalt of implementation of the 3rd of this invention is explained with reference to the drawing of drawing 15 and drawing 16. Drawing 15 shows the appearance of the dc-battery 1 of the gestalt of this 3rd operation, and drawing 16 shows the condition of the dc-battery unit 2 before carrying out resin mold. The point that the dc-battery 1 of the gestalt of the 3rd operation is different from the thing of the gestalt of the 1st operation is as follows.

[0038] Although the connector 7 is formed on the circuit board 6 with the gestalt of the 1st operation. With the gestalt of the 3rd operation, as shown in drawing 16, the connection terminals 33a, 33b, and 33c are formed on the circuit board 6. These connection terminals 33a, 33b, and 33c are connected to positive-electrode terminal 5a of a battery cell 5, and negative-electrode terminal 5b through the \*\* safety circuit at the circuit for charge control of the circuit board 6, and the time of short. The connection terminals 33a, 33b, and 33c constitute an electrical connection from a gestalt of this 3rd operation.

[0039] And as shown in drawing 15, with the dc-battery 1 of the gestalt of the 3rd operation, the connection terminals 33a, 33b, and 33c are exposed from the resin mold section 3. Since it is the same as the thing of the gestalt of the 1st operation about other configurations, the same sign is given to the same mode part, and explanation is omitted.

[0040] It can manufacture by the manufacture approach which also explained the dc-battery 1 of the gestalt of this 3rd operation in the gestalt of the 1st operation by preparing the rib which contacts the connection terminals 33a, 33b, and 33c in the internal surface of female mold 10a and punch 10b.

Moreover, the dc-battery 1 of the gestalt of this 3rd operation can equip the portable telephone which has a connection terminal corresponding to the connection terminals 33a, 33b, and 33c.

[0041]

[Effect of the Invention] Since the resin mold section functions as reinforcing materials according to invention indicated from claim 1 to claim 5 so that it may explain above, the outstanding effectiveness that the rigidity of a dc-battery improves is done so. Moreover, since a battery cell, the circuit board, and an electrical connection are wrapped in by the resin mold section and there is no clearance in the interior, a foreign matter does not trespass upon the interior of a dc-battery. Moreover, the components mark of a dc-battery can be lessened and it is effective in the simplification of structure and the thinning of a dc-battery being realizable.

[0042] Moreover, according to invention especially indicated to claim 2, when a battery cell expands by the temperature rise, it can escape in the part exposed from the resin mold section, and is effective in the ability to prevent breakage of the resin mold section. According to invention indicated to claim 6, since the dc-battery storage space in a personal digital assistant can be lessened, it is effective in small and light weight, and thin shape-ization of a personal digital assistant being realizable.

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TECHNICAL FIELD

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[Field of the Invention] This invention relates to the personal digital assistant equipped with a dc-battery suitable as an object for cellular phones etc., and this dc-battery.

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PRIOR ART

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[Description of the Prior Art] For example, the dc-battery used for personal digital assistants, such as a portable telephone and PHS (personal handy phone), is in the inclination formed into small lightweight with improvement in the dc-battery engine performance every year. Conventionally, as for the dc-battery used with a personal digital assistant, what has the case manufactured by carrying out deep-drawing shaping of the aluminum material (this is hereafter called aluminum can dc-battery) was in use. However, the aluminum can dc-battery originated in carrying out deep-drawing shaping of the case, the thickness dimension of a dc-battery had constraint, and the limitation was in thin shape-ization.

[0003] Then, a unit cell is sealed with a laminate film and the dc-battery of the lamination pack which attained small and light weight, and thin shape-ization is proposed (for example, JP,2000-323110,A). If the dc-battery of this lamination pack remains as it is, its rigidity is low and it must raise rigidity with a certain reinforcement means.

[0004] Rigidity was raised by putting the dc-battery of a lamination pack in the case made of resin from those front flesh-side both sides, carrying out ultrasonic welding of the case on a side front, and the case on a background, and pasting up conventionally, as this reinforcement approach.

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EFFECT OF THE INVENTION

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[Effect of the Invention] Since the resin mold section functions as reinforcing materials according to invention indicated from claim 1 to claim 5 so that it may explain above, the outstanding effectiveness that the rigidity of a dc-battery improves is done so. Moreover, since a battery cell, the circuit board, and an electrical connection are wrapped in by the resin mold section and there is no clearance in the interior, a foreign matter does not trespass upon the interior of a dc-battery. Moreover, the components mark of a dc-battery can be lessened and it is effective in the simplification of structure and the thinning of a dc-battery being realizable.

[0042] Moreover, according to invention especially indicated to claim 2, when a battery cell expands by the temperature rise, it can escape in the part exposed from the resin mold section, and is effective in the ability to prevent breakage of the resin mold section. According to invention indicated to claim 6, since the dc-battery storage space in a personal digital assistant can be lessened, it is effective in small and light weight, and thin shape-ization of a personal digital assistant being realizable.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] However, with this structure, since a case will be prepared in the outside of a lamination pack, there is a problem that the thickness of a dc-battery will become thick. Moreover, since it had a clearance in a case, the rigidity demanded was not able to be acquired. Furthermore, when it is made to fall, a possibility of damaging from a welding also has a case. Moreover, there is also a possibility of a foreign matter trespassing upon the interior of a case, and carrying out short-circuit etc.

[0006] then, this invention -- structure -- the personal digital assistant equipped with the dc-battery and this dc-battery of the lamination pack mold which can be equipped with predetermined rigidity though easy, and can attain small and light weight, and thin shape-ization is offered.

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MEANS

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[Means for Solving the Problem] The dc-battery applied to invention indicated to claim 1 in order to solve the above-mentioned technical problem is equipped with the battery cell of a lamination pack, the circuit board electrically connected to each terminal of this battery cell, and the electrical connection electrically connected to this circuit board, exposes the connection edge of this electrical connection, and is characterized by having covered these battery cells, the circuit board, and an electrical connection with the resin mold section, and unifying.

[0008] Thus, since the resin mold section functions as reinforcing materials by constituting, the rigidity of a dc-battery improves. Moreover, since a battery cell, the circuit board, and an electrical connection are wrapped in by the resin mold section and there is no clearance in the interior, a foreign matter does not trespass upon the interior of a dc-battery. Moreover, the components mark of a dc-battery can be lessened and the simplification of structure and the thinning of a dc-battery can be realized.

[0009] Invention indicated to claim 2 is characterized by said a part of battery cell being exposed from said resin mold section in invention indicated to claim 1. Thus, when a battery cell expands by the temperature rise by constituting, it can escape in the part exposed from the resin mold section.

[0010] It is characterized by invention indicated to claim 3 being the connector with which said electrical connection was directly prepared on said circuit board in invention according to claim 1 or 2. Thus, association of the circuit board and a connector is reinforced by the resin mold section by constituting. In invention according to claim 1 or 2, said electrical connection consists of connectors formed at the tip of the lead wire connected to the circuit board, and this lead wire, and invention indicated to claim 4 is characterized by these lead wire and a connector being exposed from the resin mold section. Thus, association of the circuit board and lead wire is reinforced by the resin mold section by constituting. It is characterized by invention indicated to claim 5 being the connection terminal with which said electrical connection was prepared on the circuit board in invention according to claim 1 or 2.

[0011] The personal digital assistant concerning invention indicated to claim 6 is characterized by having the dc-battery indicated to either of said claim 1 to claims 5. Thus, by constituting, the dc-battery storage space in a personal digital assistant can be lessened.

[0012]

[Embodiment of the Invention] Hereafter, the gestalt of implementation of this invention is explained with reference to the drawing of drawing 16 from drawing 1.

[Gestalt of the 1st operation] First, the gestalt of implementation of the 1st of this invention is explained with reference to the drawing of drawing 12 from drawing 1. Drawing 1 is the perspective view which looked at the dc-battery 1 in the gestalt of the 1st operation from the side front, and drawing 2 is the perspective view seen from the background.

[0013] Are used as the object for portable telephones and the object for PHS as a personal digital assistant, for example, a dc-battery 1 is a lithium ion dc-battery. The dc-battery 1 consists of a dc-battery unit 2, the resin mold section 3, and a label 4. The dc-battery unit 2 is equipped with a battery cell 5, the circuit board 6, and a connector (electrical connection) 7 as shown in drawing 3 and drawing 4.

[0014] A battery cell 5 is equipped with an electrolyte and an electrode in the container which made the laminate film which comes to carry out the laminating of the resin film to front flesh-side both sides of aluminium foil the shape of a tube, it piles up the terminal of a container, seals and is formed. The battery cell 5 of this lamination pack is a battery cell which can perform small and thin shape-ization as compared with what uses the metal container by which deep-drawing shaping was carried out. In the battery cell 5, positive-electrode terminal 5a and negative-electrode terminal 5b have extended.

[0015] The circuit board 6 is a substrate which contains the \*\* safety circuit at the circuit for charge control connected to positive-electrode terminal 5a of a battery cell 5, and negative-electrode terminal 5b,

and the time of short. The crevices 6a and 6a for positioning which make an abbreviation hemicycle are formed in the both ends of the circuit board 6. The connector 7 is formed in the center of a front face of the circuit board 6 in one, and is connected to positive-electrode terminal 5a of a battery cell 5, and negative-electrode terminal 5b through said each circuit of the circuit board 6. That is, the connector 7 is directly formed on the circuit board 6. This connector 7 is a member which is inserted in the connector 25 of the portable telephone K mentioned later, and connects a battery cell 5 and a portable telephone electrically. It points to plug section (connection edge) 7a of a connector 7 in the front end side of a battery cell 5.

[0016] Thus, as the constituted dc-battery unit 2 shows drawing 1, except for surface center-section 5c of a battery cell 5, and plug section 7a of a connector 7, the whole is wrapped in the resin mold section 3 without a clearance, it is unified, a label 4 is stuck on the resin mold section 3 by the side of a rear face, and the dc-battery 1 of a rectangle thin shape is constituted. Thereby, a battery cell 5, the circuit board 6, and a connector 7 are fixed by the resin mold section 3 in one.

[0017] Realizing thin shape-ization of a dc-battery 1, since according to the dc-battery 1 of the gestalt of this 1st operation resin mold section 3 the very thing has rigidity and functions as reinforcing materials, the reinforcement of the dc-battery 1 of a lamination pack mold and rigidity become high, impact nature etc. increases, and dependability improves. Moreover, since the resin mold section 3 functions also as reinforcing materials to a connector 7, its dependability of a connector 7 also improves.

[0018] Moreover, since a battery cell 5, the circuit board 6, and a connector 7 are wrapped in by the resin mold section 3 without the clearance, the fault which a foreign matter does not trespass upon the interior of a dc-battery 1, and originates in foreign matter invasion can be prevented beforehand.

[0019] Moreover, since resin mold section 3 the very thing functions as an insulating material, other insulating members are unnecessary, since a battery cell 5, the circuit board 6, and a connector 7 are really fixed by the resin mold section 3, the structure of a dc-battery 1 becomes easy and components mark can also be lessened.

[0020] Furthermore, since surface center-section 5c of a battery cell 5 is exposed from the resin mold section 3, when a battery cell 5 expands by the temperature rise, this surface center-section 5c can be bulged outside, and it can escape. Therefore, both a battery cell 5 and the resin mold section 3 are avoidable from breakage.

[0021] Next, the manufacture approach of a dc-battery 1 is explained with reference to drawing 5. First, the circuit board 6 which equipped positive-electrode terminal 5a of a battery cell 5 and negative-electrode terminal 5b with the connector 7 is joined by spot welding etc., and the dc-battery unit 2 as beforehand shown in drawing 3 is formed.

[0022] And this dc-battery unit 2 is set to attachment slot 11a formed in female mold (metal mold) 10a made from aluminum. Plug section 7a of the connector 7 of the dc-battery unit 2 is made close to 11d of paries medialis orbitae of attachment slot 11a at this time by making it engage with the locator pins 11c and 11c which formed the crevices 6a and 6a for positioning of the circuit board 6 of the dc-battery unit 2 in attachment slot 11a. Thereby, the space section is formed in the perimeter of the dc-battery unit 2.

[0023] The gage pin 12 of female mold 10a is inserted in the tooling holes 13 of punch 10b, and it carries out [ mold clamp ] of punch 10b and the female mold 10a in order to make attachment slot 11 of female mold 10a a adjust attachment slot 11 of punch (metal mold) 10b made from aluminum b in this condition. At this time, extrusion hole 11e prepared in the center section of attachment slot 11b of punch 10b is close to surface center-section 5c of a battery cell 5.

[0024] Next, polyamide resin or the resin of a polyolefine system is poured in with low-temperature low voltage from the resin impregnation slot 14 (14a, 14b) formed in a part for the joint of punch 10b and female mold 10a. Resin is poured in with low-temperature low voltage for having a bad influence neither on a battery cell 5 nor the circuit board 6. Since the mechanical strength is higher than polyamide resin, the resin of a polyolefine system is suitable to form the dc-battery 1 of high intensity.

[0025] The poured-in resin spreads in the mold cavity 11 (11a, 11b) formed between attachment slot 11a in metal mold 10, and 11b. Resin is poured into the perimeter of the dc-battery unit 2 except plug section 7a of the connector 7 close to 11d of paries medialis orbitae of surface center-section 5c of the dc-battery unit 2, and female mold 10a close to knockout hole 11e of punch 10b with the gestalt of this operation.

[0026] And a mold aperture will be carried out, metal mold 10 will be extruded, if it leaves and cools compulsorily and resin solidifies within metal mold 10, a product is extruded by the hole 15, and manufacture of a dc-battery 1 is ended. Thereby, the dc-battery 1 which surface center-section 5c of a battery cell 5 and plug section 7a of a connector 7 exposed from the resin mold section 3 is manufactured.

[0027] Since according to the manufacture approach of this dc-battery set the dc-battery unit 2 in metal

mold 10, and pour in resin into the mold cavity 11 of metal mold 10, it is made to solidify within metal mold 10, and after [ cooling ] mold aperture is carried out and the dc-battery 1 is manufactured, the dc-battery 1 which wrapped a battery cell 5, the circuit board 6, and a connector 7 in the resin mold section 3 without the clearance, and was unified can be manufactured easily, and productivity improves.

[0028] Next, the portable telephone K as a personal digital assistant which equips with said dc-battery 1 based on the drawing of drawing 6 and drawing 7 is explained. Since a display 20 and the key stroke section 21 are the things of the common knowledge structure constituted possible [ folding ] by the hinge 22, the whole configuration explains the portable telephone K shown below only with the perspective view seen from the background in the condition of having folded up so that it might not be shown but he could understand the wearing condition of a dc-battery 1.

[0029] The concave hold section 23 which equips the background of a control unit 21 with a dc-battery 1 is formed in the portable telephone K. A lid 24 is attached in this hold section 23 removable. Stop section 24b is formed in a tip side. Heights 24a and 24a stop stop section 24b on the discharge hook H by the side of a portable telephone K, where Heights 24a and 24a are stopped in the hold section 23, and specifically, they attach in the end face side of a lid 24 at the hold section 23.

[0030] The body side connectors 25 which are paries-medialis-orbitae 23a which counters the hold section 23 in the slide direction of a dc-battery 1, and are inserted in this connector 7 in the location which counters a connector 7 are \*\*\*\*\* with picking. That is, after setting a dc-battery 1 to the hold section 23, it has the structure where the connector 7 of a dc-battery 1 is connected to the body side connector 25 by making a dc-battery 1 slide to the connector 7 side which is the front. Therefore, when the hold section 23 equips with a dc-battery 1 and a connector 7 is inserted in the body side connector 25, the space section for plug cost of a dc-battery 1 will be formed between the back end sections of a dc-battery 1.

[0031] And as shown in drawing 7, pair formation of the fixed rib 26 is carried out on the background by the side of the end face of a lid 24. These fixed ribs 26 and 26 are inserted in the space section formed between the hold section 23 and the back end section of a dc-battery 1 at the time of junction of the connector 7 of a dc-battery 1, i.e., the space section used as the plug cost of a connector 7. And each fixed rib 26 is equipped with inclined plane 26a, and when a lid 24 is attached in the hold section 23, it generates the force which supports the back end section of a dc-battery 1 (going ahead). thus, dc-battery 1 the very thing is miniaturized, and the tooth space of a harness of the hold section 23 which contains a dc-battery 1 in the constituted portable telephone K is unnecessary -- since only a part can be made small -- a portable telephone K -- as a whole -- this -- small -- it can lightweight-ize.

[0032] Next, according to the drawing of drawing 6 - drawing 12, the procedure of equipping a portable telephone K with a dc-battery 1 is explained. As shown in drawing 6, the lid 24 of a portable telephone K is opened and removed, and the hold section 23 is equipped with a dc-battery 1 ( drawing 8 ). Next, as an arrow head shows, a dc-battery 1 is made to slide ahead to drawing 8, and the connector 7 of a dc-battery 1 is inserted in the body side connector 25 at it ( drawing 9 ). As shown in drawing 10 and drawing 11, height 24a of a lid 24 in next, the condition of having stopped in the hold section 23 If a lid 24 is rotated in the direction of closing, a fixed rib 26 will be inserted between the back end section of a dc-battery 1, and the hold section 23. If stop section 24b stops on the discharge hook H by the side of a portable telephone K ( drawing 12 ), it will be blocked with a lid 24 and the hold section 23 will end the attachment to the portable telephone K of a dc-battery 1. When equipping with a dc-battery 1 in the case of the gestalt of this 1st operation, since the actuation which folds up and contains a harness becomes unnecessary, wearing becomes easy. Moreover, migration in the direction from which a dc-battery 1 separates with the fixed rib 26 of a lid 24 can be regulated, and a dc-battery 1 can be attached certainly without a backlash.

[0033] [Gestalt of the 2nd operation] Next, the gestalt of implementation of the 2nd of this invention is explained with reference to the drawing of drawing 13 and drawing 14. Drawing 13 shows the appearance of the dc-battery 1 of the gestalt of this 2nd operation, and drawing 14 shows the condition of the dc-battery unit 2 before carrying out resin mold. The point that the dc-battery 1 of the gestalt of the 2nd operation is different from the thing of the gestalt of the 1st operation is as follows.

[0034] With the gestalt of the 2nd operation, although the connector 7 is directly formed on the circuit board 6 with the gestalt of the 1st operation, as shown in drawing 14, the harness (lead wire) 31 connected to the \*\* safety circuit at the circuit for charge control of the circuit board 6 and the time of short extends from the center section of this circuit board 6, and the connector 32 is formed at the tip of this harness 31.

[0035] And as shown in drawing 13, with the dc-battery 1 of the gestalt of the 2nd operation, the base of the harness 31 which separates from the circuit board 6 to the point is exposed from the resin mold section 3. With the gestalt of this 2nd operation, the harness 31 and the connector 32 constituted the

electrical connection, and most and the connector 32 of a harness 31 are exposed from the resin mold section 3. Since it is the same as the thing of the gestalt of the 1st operation about other configurations, the same sign is given to the same mode part, and explanation is omitted.

[0036] In the dc-battery 1 of the gestalt of this 2nd operation, since the resin mold section 3 reinforces the connection of a harness 31 and the circuit board 6, dependability improves. Since it is the same as the thing of the gestalt of the 1st operation about other operation and effectiveness, explanation is omitted. It can manufacture by the manufacture approach which also explained the dc-battery 1 of the gestalt of this 2nd operation in the gestalt of the 1st operation by preparing the hole which makes a harness 31 insert in a part for the joint of female mold 10a and punch 10b. Moreover, the dc-battery 1 of the gestalt of this 2nd operation can equip the portable telephone which has the hold space of a harness 31, and a connector corresponding to a connector 32.

[0037] [Gestalt of the 3rd operation] Next, the gestalt of implementation of the 3rd of this invention is explained with reference to the drawing of drawing 15 and drawing 16. Drawing 15 shows the appearance of the dc-battery 1 of the gestalt of this 3rd operation, and drawing 16 shows the condition of the dc-battery unit 2 before carrying out resin mold. The point that the dc-battery 1 of the gestalt of the 3rd operation is different from the thing of the gestalt of the 1st operation is as follows.

[0038] Although the connector 7 is formed on the circuit board 6 with the gestalt of the 1st operation With the gestalt of the 3rd operation, as shown in drawing 16, the connection terminals 33a, 33b, and 33c are formed on the circuit board 6. These connection terminals 33a, 33b, and 33c are connected to positive-electrode terminal 5a of a battery cell 5, and negative-electrode terminal 5b through the \*\* safety circuit at the circuit for charge control of the circuit board 6, and the time of short. The connection terminals 33a, 33b, and 33c constitute an electrical connection from a gestalt of this 3rd operation.

[0039] And as shown in drawing 15, with the dc-battery 1 of the gestalt of the 3rd operation, the connection terminals 33a, 33b, and 33c are exposed from the resin mold section 3. Since it is the same as the thing of the gestalt of the 1st operation about other configurations, the same sign is given to the same mode part, and explanation is omitted.

[0040] It can manufacture by the manufacture approach which also explained the dc-battery 1 of the gestalt of this 3rd operation in the gestalt of the 1st operation by preparing the rib which contacts the connection terminals 33a, 33b, and 33c in the internal surface of female mold 10a and punch 10b. Moreover, the dc-battery 1 of the gestalt of this 3rd operation can equip the portable telephone which has a connection terminal corresponding to the connection terminals 33a, 33b, and 33c.

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[Translation done.]

## \* NOTICES \*

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1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.\*\*\*\* shows the word which can not be translated.

3.In the drawings, any words are not translated.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the perspective view which looked at the dc-battery of the gestalt of implementation of the 1st of this invention from the front-face side.

[Drawing 2] It is the perspective view which looked at the dc-battery of the gestalt of said 1st operation from the rear-face side.

[Drawing 3] It is the perspective view of the dc-battery unit of the gestalt of said 1st operation.

[Drawing 4] It is the decomposition perspective view of the dc-battery unit of the gestalt of said 1st operation.

[Drawing 5] It is the perspective view showing the manufacture metal mold of the dc-battery of the gestalt of said 1st operation.

[Drawing 6] They are the dc-battery of the gestalt of said 1st operation, and the decomposition perspective view of a portable telephone.

[Drawing 7] It is the perspective view showing the background of the covering device of the portable telephone of the gestalt of said 1st operation.

[Drawing 8] It is the perspective view of the portable telephone in which the attachment procedure of the dc-battery of the gestalt of said 1st operation is shown.

[Drawing 9] It is the perspective view of the portable telephone in which the attachment procedure of the dc-battery of the gestalt of said 1st operation is shown.

[Drawing 10] It is the perspective view of the portable telephone in which the attachment procedure of the dc-battery of the gestalt of said 1st operation is shown.

[Drawing 11] It is the perspective view of the portable telephone in which the attachment procedure of the dc-battery of the gestalt of said 1st operation is shown.

[Drawing 12] It is the perspective view showing the completion condition of the portable telephone after dc-battery wearing of the gestalt of said 1st operation.

[Drawing 13] It is the perspective view of the dc-battery of the gestalt of implementation of the 2nd of this invention.

[Drawing 14] It is the perspective view of the dc-battery unit of the gestalt of implementation of the 2nd of this invention.

[Drawing 15] It is the perspective view of the dc-battery of the gestalt of implementation of the 3rd of this invention.

[Drawing 16] It is the perspective view of the dc-battery unit of the gestalt of implementation of the 3rd of this invention.

[Description of Notations]

1 Dc-battery

2 Dc-battery Unit

3 Resin Mold Section

5 Battery Cell

5a Positive-electrode terminal

5b Negative-electrode terminal

5c Surface center section

6 Circuit Board

7 Connector (Electrical Connection)

7a Plug section (connection edge)

31 Harness (Electrical Connection)

32 Connector (Electrical Connection)



33a, 33b, 33c Connection terminal (electrical connection)  
K Portable telephone (personal digital assistant)

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[Translation done.]

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1.This document has been translated by computer. So the translation may not reflect the original precisely.

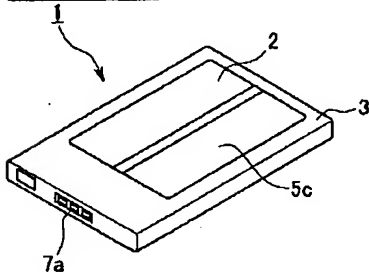
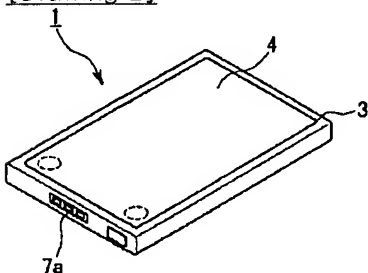
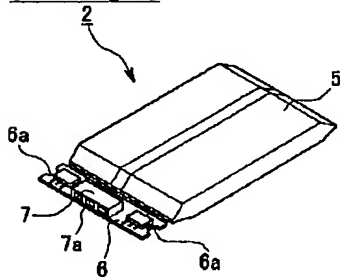
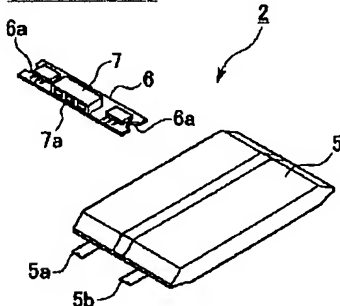
2.\*\*\* shows the word which can not be translated.

3.In the drawings, any words are not translated.

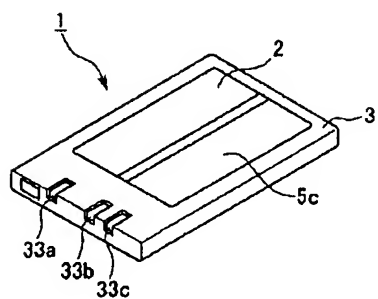
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DRAWINGS

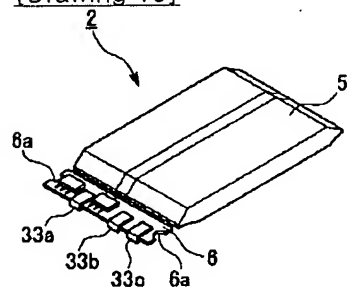
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[Drawing 1][Drawing 2][Drawing 3][Drawing 4][Drawing 5]

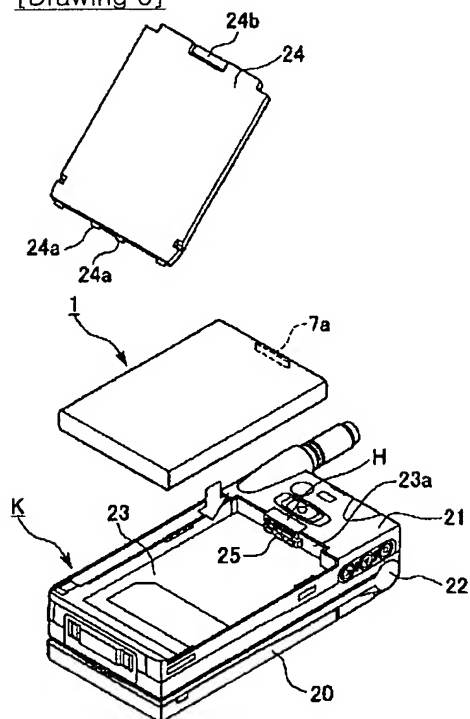




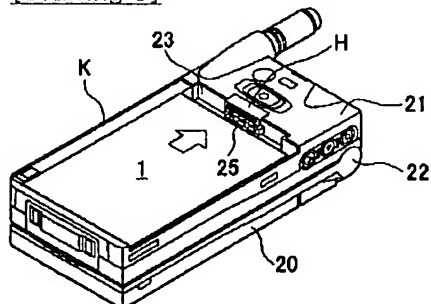
[Drawing 16]



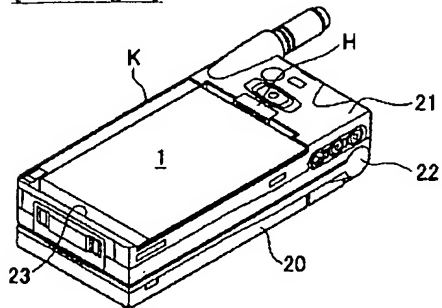
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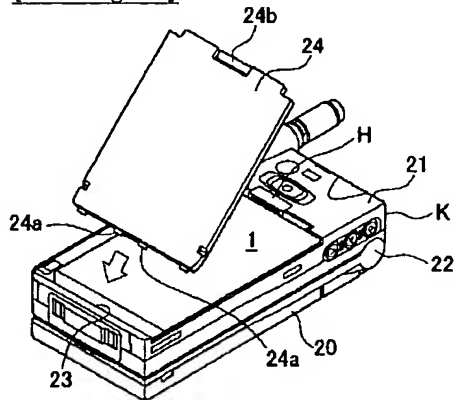
[Drawing 8]



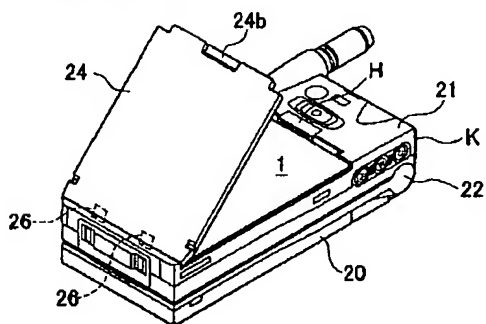
[Drawing 9]



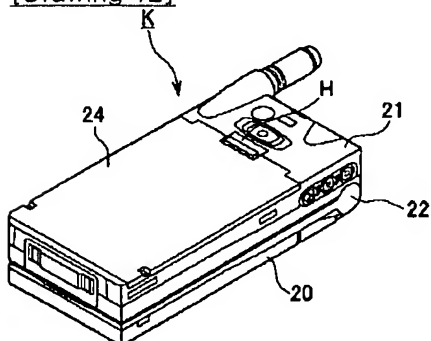
[Drawing 10]



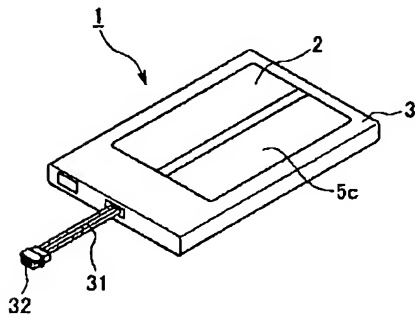
[Drawing 11]



[Drawing 12]



[Drawing 13]



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[Translation done.]